

# Investigating magnetic water usage in Concrete structure

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## Abstract

One of the most important and usable construction materials used in civil projects is concrete. High performance concrete (HPC) has more appropriate performance in consistency, compressive strength and durability respect comparing ordinary concrete. One of ways of improving physical features and specifications of concrete is improving the water physical specifications as one of main elements constituting the concrete. In recent decades, in countries like Russia and China, a new and advanced technology has been discussed called magnetic water. This water is passed a magnetic field with varying current intensity and as a result, its physical quality undergoes some changes. Due to these changes, the water molecular structure is altered and the number of molecules in a molecular community is reduced from 14 molecules to 5 or 6 and as a result, the surface tension of water is decreased. Using magnetic water in the concrete structure, in one hand, increases the consistency of concrete mixture and reduction of water to cement ratio and on the other hand, by facilitating the cement hydration process increases the concrete strength and durability.

**Keywords:** magnetic water, concrete, consistency, compressive strength, slump.

## 1. Introduction

Today, main components of the concrete such as its compressive strength, consistency and durability have been considered by engineers and researchers of construction industry. By increasing the concrete compressive strength, many advantages could be obtained like sections downsizing, costs reduction and environmental damages and increasing concrete durability. Also, increase of fresh concrete consistency provides the ease and simplicity of implementation and concrete placing possibility in various conditions and allows the designer engineers to utilize concrete mixtures with less water to cement ratio.

Magnetic water is water which has been passed a magnetic field and its features have been influenced by magnetic forces. This water which is introduced as environment friendly is produced with low cost and limited equipment. One of the most important impacts of magnetic water on passing water us scattering and change of water molecular arrangement. Due to these changes the number of molecules in a molecular assembly is reduced and this leads to increasing of water participation in the cement hydration process. Su et.al in 2000 studied the impact of using magnetic water on mechanical specifications and features of the concrete containing Pozzolan slag of iron furnace. In their research, several mixture plans with 5, 10, 15, 20 and 25% Pozzolan replacement were used. The results of their studies briefly stated that magnetic water with intensity of 0.8, 1.2 and 1.3 tesla shows 10 to 20%